

## **COMPRESSOR UTILIZING LOW VOLT POWER**

### **TAPPED FROM HIGH VOLT POWER**

#### **BACKGROUND OF THE INVENTION**

- [1] This invention relates to a system provided within the shell or sealed housing of a compressor for converting high voltage electric power from a single power source to low voltage electric power for powering the auxiliary compressor systems, such as a diagnostic control device.
- [2] Compressors are utilized to compress a refrigerant as part of a refrigerant cycle in cooling systems. Modern compressors for refrigerant compression are typically enclosed within a sealed housing. Typically compressors are driven by an electric motor which receives high voltage electric power from an outside electrical power source by way of a power line extending through an opening in the sealed housing. It is essential that all openings through the sealed housing are well sealed to prevent leakage.
- [3] Refrigerant compressors operate under extreme conditions and may have relatively complex operational components. Compressor operation presents many design challenges. In addition to the potential for leakage as mentioned above, there is the potential for a variety of operational faults to occur during use as well as during startup and shutdown. For example, an overcharge or undercharge of refrigerant can hinder compressor performance. An improperly wired compressor can also result in compression malfunction.
- [4] Typically, compressors have been provided with a plurality of protection devices that sense various performance properties of essential compressor components as compared to predetermined values. The protection devices then respond accordingly in a

predetermined manner. For example, the electric motor used for driving a compressor pump is typically provided with a protection switch, which is actuated if a predetermined temperature is reached at which point the motor is stopped. Also, condition responsive valves have been proposed in sealed compressors.

[5] The inventors of this application have recently proposed sensing various performance properties of essential compressor components using a singular diagnostic control device. The diagnostic control device, which is preferably microprocessor based, receives signals relating to a number of operational factors in a compressor. The diagnostic control device is disclosed in co-pending application No. \_\_\_\_\_, filed \_\_\_\_\_, entitled "Compressor Diagnostic System".

[6] Typically, the compressor elements are driven by an electric motor. The electric motor is housed within the compressor shell and is powered by a high voltage source originating at a point outside the compressor shell by way of a power line received through an inlet opening in the compressor shell.

[7] The microprocessor based diagnostic control device operates using relatively low voltage electric power as compared to the relatively high voltage electric power required to power the electric motor of the compressor. The same is true for the above-mentioned sensors, etc.

[8] Thus, it would be desirable for a low voltage device, such as diagnostic control device, a sensor, etc. to make use of the existing electric power supply that powers the electric motor of the compressor. Thus, the low voltage device can be positioned within the compressor shell without requiring additional low volt wiring to be fed through any additional openings in the sealed compressor shell.

### **SUMMARY OF THE INVENTION**

[9] In the disclosed embodiment of this invention a refrigerant compression system is provided with an electronic circuit to feed low voltage electrical power to a diagnostic control device. The diagnostic control device is positioned within the sealed housing, of the compressor and operates using low volt electrical power. The low volt electrical power required to operate the diagnostic control device is obtained from an existing high volt electric power source that is used to power the motor of the compressor.

[10] The compressor shell is provided with an inlet opening through which a high volt power line extends. The high volt power line extends from a high voltage electric power source positioned outside of the sealed compressor shell. Within the compressor shell, the electric power used to operate the diagnostic control device is tapped from the existing high voltage incoming power line, and then converted to the required low volt electric power. The power is converted using a known conversion circuit preferably including a transformer.

[11] The diagnostic control device is powered with the desired low volt electric power using the existing high volt power line. Thus, the necessity to feed additional low volt wiring through any additional inlet openings in the compressor shell is eliminated.

[12] While the invention is disclosed for powering a diagnostic control device, other low voltage devices such as sensors, etc. can also be powered in this fashion.

[13] These and other features of the present invention can be best understood from the following specification and drawing, the following of which is a brief description.

### **BRIEF DESCRIPTION OF THE DRAWING**

- [14] Figure 1 is a schematic view of a portion of a sealed compressor that incorporates a system to feed low voltage electrical power to a diagnostic control device.

### **DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT**

- [15] A sealed compressor 10 is illustrated generally and schematically in Figure 1. It should be understood that compressor 10 is preferably incorporated into a refrigerant cycle, such as that typically found in air conditioning or other cooling or heating cycles.
- [16] A compressor pump unit, as that typically utilized in a scroll type compressor, is schematically shown at 12. The scroll compressor pump unit 12 is driven by electric motor 14. Electric motor 14 is powered by a high voltage outside power source 16. The power source may be three phase, or single phase. Compressor pump unit 12 and electric motor 14 are housed in sealed compressor shell 18. The high voltage electric power from outside power source 16 is fed to motor 14 by way of incoming power line 20 which enters compressor shell 18 through inlet opening 22.
- [17] A diagnostic control device 24 is provided at a location within the compressor shell 18. Diagnostic control device 24 can monitor a variety of operational conditions of the compressor 10 during use. The details of the control device are as disclosed in co-pending application, Serial No. \_\_\_\_\_, filed \_\_\_\_\_ and entitled "Compressor Diagnostic System". Diagnostic control device 24 requires a relatively low volt electrical power supply in order to operate. Electrical power is tapped from incoming power line 20 at a power tap and converted to the required lower voltage electrical power by way of conversion circuit 27 which include a transformer and appropriate circuit safety components. A worker in the electrical arts could provide an appropriate conversion

circuit. The lower voltage electrical power is then supplied to diagnostic control device 24 by way of power feed line 28.

[18]           The diagnostic control device 24 operates using power from the existing incoming power line 20, thus eliminating the need for additional low volt wiring to be fed through any additional openings in the compressor shell 18.

[19]           A sensor 40 is also shown schematically and controls an electronically operated valve 42. Devices 40 and 42 both operate using low voltage and receive power from conversion circuit 27. The devices 24, 40 and 42 can be used individually, or in combination. If more than one device is powered by circuit 27, an appropriate routing circuit may be used. It should be understood the devices 40 and 42 may be as known, and form no portion of this invention.

[20]           A preferred embodiment of this invention has been disclosed, however, a worker in this art would recognize that certain modifications would come within the scope of this invention. For that reason, the following claims should be studied to determine the true scope and content of this invention.